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ABSTRACT

The intent of this long-range plan is to provide direction for local, regional, and state level planning so that technology can be applied more effectively to enhance the teaching/learning environment and to improve the management of schools in the state of New York. The plan expands the statement of direction outlined in the "Statement of Strategic Direction for Computer Technology" (1984) to address instructional applications, instructional support, and management applications of technology in a more comprehensive manner. The major sections of the report include: (1) a description of existing programs utilizing educational technology throughout the state; (2) an outline of the 24 assumptions underlying the "Vision of the Future" paper which was presented to teachers, district superintendents, and superintendents of schools for evaluation in the summer of 1989; (3) a synthesis and reorganization of the "Vision" paper based upon the evaluation; (4) an outline of critical elements required to implement the dimensions of the paper; (5) a list of impediments to implementing the plan, as identified by reviewers of the earlier "Vision" paper; (6) a statement of four major action recommendations proposed for approval by the Board of Regents for implementing the plan; and (7) recommended options for implementing the plan. Appended is a list of the technology network ties policies for statewide information systems as adopted by the State Board of Regents in 1989. The rationale for each policy is included. (GL)

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Long-Range Plan for Technology in Elementary and Secondary Education in New York State

Using Technology to Pursue Excellence in Schools

The University of the State of New York
The State Education Department
Office of Elementary and Secondary Education
Albany, New York

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Using Technology to Pursue Excellence in Schools

The University of the State of New York
The State Education Department
Office of Elementary and Secondary Education
Albany, New York

January 1990

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The *Long-Range Plan for Technology in Elementary and Secondary Education in New York State* was cooperatively developed by:

Teachers
Superintendents of Schools
District Superintendents
State Education Department Staff
State Educational Organizations
Industry Representatives

Staff of the Office of Elementary and Secondary Education Planning, Testing and Technological Services, Division of Elementary and Secondary Education Planning, Bureau of Technology Applications coordinated the development of the Long-Range Plan.

I. INTRODUCTION

For hundreds of years, farming and other industries have relied on technology. This reliance has improved the efficiency and productivity of the United States in world markets. However, our world continues to change rapidly and the information age is upon us. Industries remaining competitive have vigorously embraced the new information and management technologies. Their use of these new computer-based technologies is critical to economic survival. Within the education sector, it is no longer debatable that technology must be integrated into all school-related operations. This *Long-Range Plan* begins to address this great need in New York State. Pervasive integration of appropriate technology within all levels of our educational system is the goal of this *Long-Range Plan.*

In recognition of this need, the State Education Department, District Superintendents, and Superintendents of Schools collaboratively developed a *Statement of Strategic Direction for Computer Technology* in 1984. This statement guided the efforts of the Department over the past five years. Much of what is outlined in that document is now implemented in the Technology Network Ties system.

The Technology Infrastructure. The *Long-Range Plan for Technology in Elementary and Secondary Education in New York State* expands that statement of direction to address the following technology applications in a more comprehensive manner:

This Long-Range Plan *includes instructional, instructional support and management applications of technology.*

- INSTRUCTIONAL APPLICATIONS of technology to directly support the teaching/learning environment, such as using word processing and databases across all subjects.

- INSTRUCTIONAL SUPPORT APPLICATIONS of technology to enhance the interaction between students and resources such as libraries and guidance services.

- MANAGEMENT APPLICATIONS of technology to manage human and material resources of the school, including instructional, personnel and financial applications.

Effective planning requires a clear understanding of the past and present as well as a clear vision of the future.

These technology applications are major components of the technology infrastructure for New York State schools. The use of these technology applications to support the teaching/learning environment of schools is central to this *Long-Range Plan* (see Figure 1). The focus is on the use of these technology applications in the pursuit of excellence in schooling.

Strategic planning for the future requires a clear vision of the future as well as a clear understanding of the past and present context of educational technology in New York State. The vision of the future in this *Long-Range Plan* (Chapter IV) creates a framework for responsible management and a focus for action. As John Naisbitt advised in *Megatrends*:

> One first needs a strategic vision of the future — a sense of what the future will look like — in order to develop a cogent plan for the future.

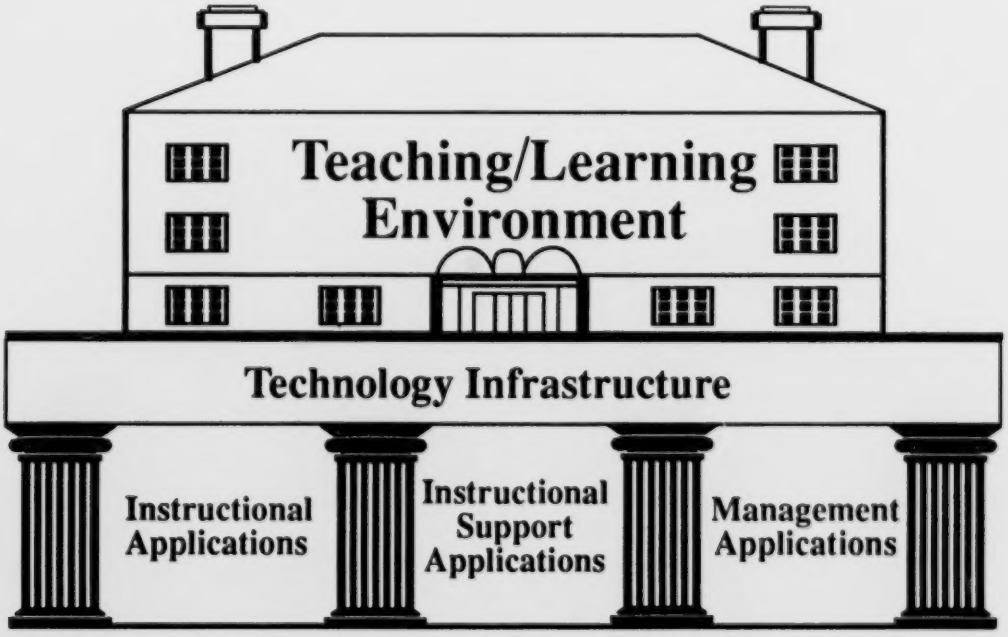

Figure 1. Technology Support of the Teaching/Learning Environment

This *Long-Range Plan* also supports the educational priorities of the State Education Department and the Regents goals of excellence and equity.

This Plan supports the priorities of excellence and equity.

- EXCELLENCE. The Regents have emphasized, through statewide comprehensive initiatives, the need to improve the quality, appropriateness and effectiveness of educational planning, services, resources, curricula and programs within K-12 schools, BOCES, and other educational institutions.

- EQUITY. The Regents have proposed programs and legislation to enhance equitable access to and increase opportunities within the educational system for all citizens of the State.

In addition to excellence and equity this *Long-Range Plan* will encourage state, regional and local educational planning that centers on critical issues in economic development and changing demographics. New York State is well-situated to take advantage of an economy that is increasingly becoming technology oriented. School improvement supported by technology will positively impact both the education and economic sectors of the State.

Priority activities of the Office of Elementary and Secondary Education, such as the need for continued implementation of the Regents *Action Plan to Improve Elementary and Secondary Education Results in New York* (1984), ensuring better beginnings, and improving high school completions, also serve as a context for the vision of the future envisioned in this *Long-Range Plan*.

The Teaching/Learning Environment. As depicted in Figure 1, a school's teaching/learning environment is the focal point of New York State's education system. This teaching/learning environment can be described as the adequacy of instructional time and the appropriateness of instructional and classroom management practices designed to achieve intended learning outcomes. Through the cooperation of the community, Board of Education, administrators, teachers, parents and students, a school's teaching/learning environment is designed and maintained by policy, curriculum documents, staff development practices, testing and reporting procedures. In planning for the appropriate use of technology in schooling, all of these constituencies must be fully involved in shared decision making throughout the entire process, including development, implementaation and evaluation activities.

A school's teaching/learning environment is the focal point of the state's education system.

When the pursuit of excellence is of prime concern, local

planning activities will focus on school improvement. Planning for school improvement, including technologies supporting improvement priorities, should therefore be based on the following assumption:

The foundation for pursuing excellence in schools should be thoughtful curriculum development and deliberate curriculum implementation.

> The foundation for pursuing excellence in schools should be thoughtful curriculum development and deliberate, cooperative curriculum implementation supported by staff development aimed at increasingly more effective classroom instructional practice.

Strong curriculum development and implementation are very difficult tasks requiring translation of complex State syllabus documents into sets of coherent and operational learning outcomes. This *Long-Range Plan* recognizes the importance of constructive collabortion among local, regional and State educators and constituencies in the development of curricula that include appropriate applications of technology. It is assumed that local school districts will collaborate with other districts and BOCES on the development of the high-quality curricula intended in State syllabi. Planning for pursuing excellence must begin with, and be based at, the building and district levels. It is our perspective that coordinated regional and State-level planning are also critical to success and that planning should focus on the teaching/learning environment.

Purposes, Recommendations and Benefits of the *Long Range Plan*. The intent of this *Long-Range Plan* is to provide direction for local, regional and State level planning so technology can be applied more effectively to:

- enhance the teaching/learning environment and
- improve the management of schools.

Four recommendations are proposed for Regents approval to ensure that these purposes are achieved:

Recommendation 1:

The Regents support the complete integration of technology into the teaching/learning environment of schools and the establishment of teacher and student access to the telecommunications capabilities of the Statewide TNT network and other network services.

Recommendation 2:

The Regents approve the development of technology systems, including the completion of the development of the Statewide TNT System, the Student and Finanical database management applications, and connection of all school buildings throughout the State for communications, sharing and reporting purposes.

Recommendation 3:

The Regents approve the development and implementation of planning procedures and support activities for complete technology integration at the local, regional and State educational levels.

Recommendation 4:

The Regents direct the State Education Department to develop policies and procedures for Statewide monitoring and evaluation of the implementation of the *Long-Range Plan* and the tracking of technology-based efforts and expenditures in order to document their effectiveness.

Benefits of Implementation

The implementation of these recommendations will result in the following benefits or enhancements in the teaching/learning environment:

- Support for equity and excellence via technology's capability for more individualized instruction that matches student needs at any learning site.
- Support for economic development through graduation of students who are employable or well-prepared for post-secondary schooling.
- Improvement of student learning by enhancing both management and instructional functions.
- Support of instructional staff in the more effective integration and delivery of curriculum and the management of student learning.

- School improvement and increased accountability for student learning and educational resource utilization in cooperation with developments in school reform and school effectiveness.

- Improved decision-making through better access to information resources, as well as support for the collection, maintenance and analysis of information through computer software tools.

- Support for teachers, building administrators and superintendents in carrying out their respective responsibilities on a daily basis.

This Long-Range Plan *represents a consensus of statewide support.*

The *Long Range Plan* Development Process. The *Long-Range Plan* has been developed cooperatively with teachers, District Superintendents, Superintendents of Schools and others. As an initial step in that process, a "Vision of the Future" paper outlining future technology applications for the educational system in 1995 was prepared and distributed to the field for extensive evaluation during June - August, 1989.

By the end of August 1989, a total of 494 evaluations were received. The respondents reacted favorably to the overall direction for the future applications of technology presented in the "Vision of the Future" paper. On a scale of 1 (strongly disagree) to 10 (strongly agree), the average rating for the "Vision of the Future" paper as a whole was 7.39.

The Long-Range Plan *was developed cooperatively with Teachers, District Superintendents and Superintendents of Schools.*

The draft *Long-Range Plan*, incorporating evaluators' recommendations, was developed in September 1989 and distributed to the following constituencies for evaluation in October 1989:

- District Superintendents
- Superintendents of Public Schools
- "Big Five" City School Districts
- BOCES Professional Staff (Educational Communications Directors, Instructional Computer Coordinators, Regional Information Center and Computer Center Directors)
- Directors, Teacher Resource and Computer Training Centers
- Selected Sample of 600 New York State Teachers
- 1,000 teachers and computer coordinators who attended the 24th Annual Conference of the New York State Association for Computers and Technology in Education (October 22-24, 1989)
- 200 students who attended the New York State Student Leadership Conference (October 30, 1989)

- New York State PTA, Board of Managers
- New York State United Teachers (NYSUT) Technology Committee and 840 NYSUT representatives
- New York State Schools Boards Association
- State Education Department staff
- New York State professional organizations
- New York State Public Broadcasting Stations
- Field representatives of the Office of Vocational and Educational Services to Individuals with Disabilities
- Directors of Reference and Research Library Resources Systems, Directors of School Library Systems and Directors of Public Library Systems
- Industry strategic planners.

A total of 784 evaluations were received as of early December, 1989. The respondents indicated positive agreement with each of the four major recommendatons in the *Long-Range Plan*. On a scale of 1 (strongly disagree) to 10 (strongly agree), the average ratings for the four recommendations ranged from 7.28 to 8.10.

Respondents were also asked to evaluate a series of three different options for implementing each of the four recommendations using the same scale. The evaluation results for the recommendations are presented in Chapter VII and evaluation results for the options are presented in Chapter VIII of the *Long-Range Plan*.

The final draft *Long-Range Plan*, guided by both the results of the evaluation process and commentaries suggested by field constituencies, was developed in early December 1989 following the evaluation process. It will be reviewed, revised and approved by Department Executive Staff, the Commissioner and the Elementary and Secondary Subcommittee of the Regents during the period from December 1989 to March 1990. Request for approval of the full Board of Regents is expected to occur in May 1990. The *Long-Range Plan* will therefore represent a consensus of educators and practitioners from many perspectives throughout the State.

Outline of the Long-Range Plan

Outline of the *Long-Range Plan*. Following this Introduction, Chapter II, "Context for Strategic Directions for Technology," reviews current technology programs related to instruction, instructional support and management. Chapter III identifies the assumptions that undergird the *Long-Range Plan*. Chapter IV, "Vision of the Future," describes the teaching/learning

environment in 1995, if technology were effectively integrated across several dimensions of the educational system. Chapters V and VI identify the critical elements required (V) and the impediments to be overcome (VI). Chapter VII presents the action recommendations and the major steps for implementing each recommendation. Chapter VIII includes the recommended options and evaluation results that guided the selection of these options for implementing the *Long-Range Plan*.

II. CONTEXT FOR STRATEGIC DIRECTIONS FOR TECHNOLOGY

The State Education Department has implemented several technology initiatives within the State's elementary and secondary educational system during the past five years. These programs served as a foundation for developing recommendations in this *Long-Range Plan* for the future use of technology in schools.

The Expansion of Technology Resources in Schools. There has been a continued expansion in the acquisition and use of technology for instructional applications within New York State's public schools during the past four years. Figure 2 shows the increase in the total number of microcomputers acquired by public schools from 1985-88.

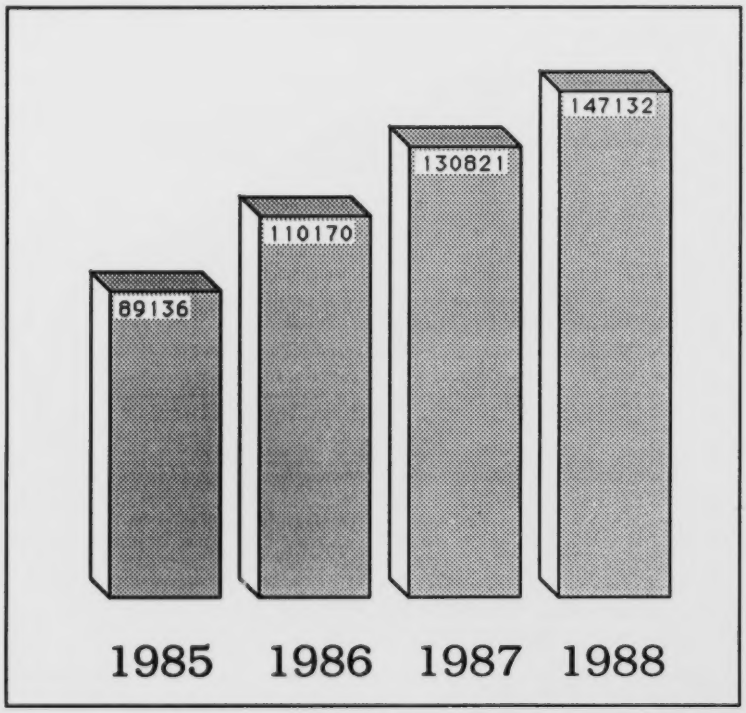

Figure 2. Number of Microcomputers Owned by New York State's Public Schools, 1985-88

Since 1984, the percentage of public school students using microcomputers regularly for instruction has also increased (see Figure 3).

The number of microcomputers per school has increased as well, from 23 per school in 1985 to 37 per school in 1988. This increase

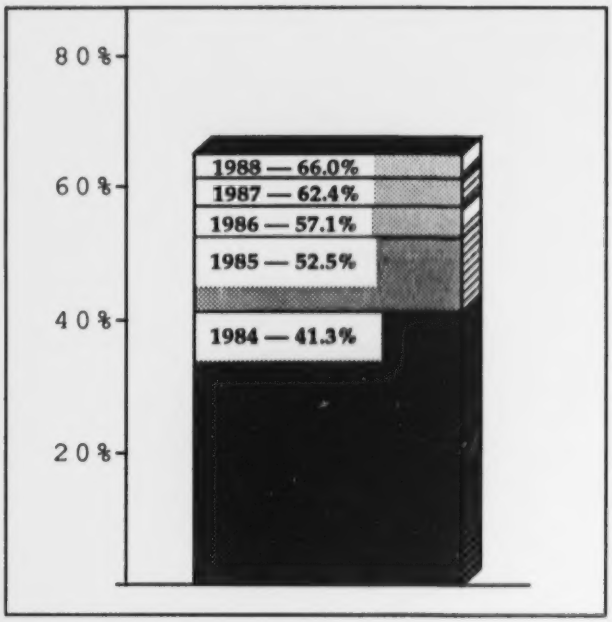

Figure 3. Percent of Students Using Microcomputers Regularly in New York State's Public Schools, 1984-88

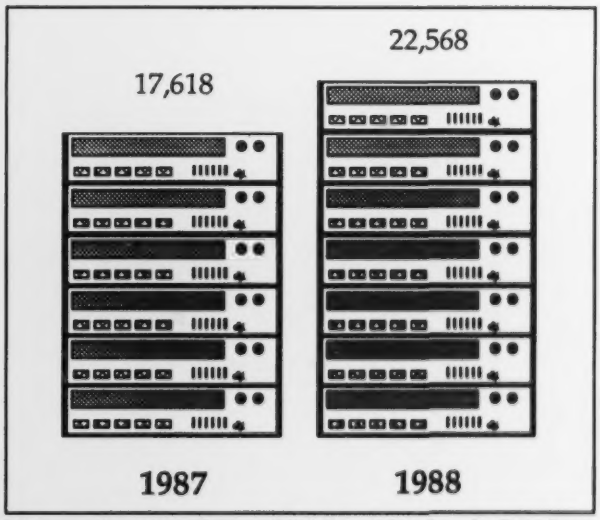

Figure 4. Number of Video Playback Devices Owned by New York State's Public Schools, 1987-88

has been accompanied by a decline in the ratio of students per micro for the same period. In 1985, there was an average of 29 students per microcomputer. By 1988, there was a ratio of 17 students per micro, thus reflecting enhanced student access to microcomputer resources.

New York State's public school teachers have also used video technology to enhance instruction. By Fall 1988, 72,386 teachers used television for instruction and 6,522 teachers used video production technology for instruction.

New York State's public schools continue to acquire video resources. For example, Figure 4 shows the total number of video playback devices (video cassette recorder/players) in New York State's public schools from 1987 to 1988. The number of television receivers in public schools has increased from 36,435 in 1987 to 38,362 in 1988.

Access to television programming among New York State's public schools also continues to grow. In 1988, 3,377 schools could receive public television and 2,416 schools had access to cable television (CATV).

In addition to these resources, the State's 41 BOCES have provided school districts with a range of technology-based services, including:

- Computer-managed or computer-assisted instructional services.
- Information retrieval services that provide on-line access to information services.
- Computer-based career guidance systems.
- Computer management/data

processing services for supporting student, financial and personnel applications

Major Technology-Related Programs. Technology programs have been initiated in several Department program offices that provide comprehensive support for New York State's educational system. For example, the Public Broadcasting Program oversees distribution of funding to the State's Public Television System that has resulted in the acquisition of instructional programming for use in the state. The Teacher Resource and Computer Training Centers, under the general guidance of the Teacher Center Program Office, train teachers on the uses of technology. The Division of Library Development and the Bureau of School Library Media Programs, in cooperation with the Statewide Library systems, have developed initiatives to enhance library resource-sharing and automation through technology. Detail on all Department technology programs is available from the Bureau of Technology Applications.

Table 1 identifies major technology-related programs managed by the Department. These technology-related programs focus specifically on the use of technology by students, teachers and administrators.

Table 1
State Funding for Technology-Related Programs and Resources, 1987-90

Program	1987-88	1988-89	1989-90
State Aid for Hardware	9,300,000	9,300,00	9,480,000
State Aid for Software	8,300,000	8,300,000	9,120,000
Technology Network Ties (TNT)	4,035,000	4,825,000	4,350,000
TNT/Model Schools	340,000†	375,000†	250,000†
TNT/Distance Learning	325,000*		
TNT/Youth-at-Risk Clearinghouse		186,000	
Student Information System (SIS)	6,500,000	9,000,000	9,000,000
Comprehensive Instructional Management System (CIMS)	4,800,000	5,300,000	5,400,000
BOCES Shared Services Aid for Management and Instruction	23,980,591	22,194,869	23,087,730
Computer Services for "Big Five" Cities	16,450,000	16,495,614	16,472,807
Special Legislative Grants	6,500,000	7,000,000	6,750,000
Teacher Resource and Computer Training Centers	15,000,000	16,000,000	17,500,000

* Funded entirely from TNT
† 1987-88, combined funding from TNT ($140,000)/CIMS ($200,000)
1988-89, combined funding from TNT ($175,000)/CIMS ($200,000)
1989-90, combined funding from TNT ($150,000)/CIMS ($100,000)

Instructional Applications. Several programs were implemented under Technology Network Ties to integrate instructional technology applications within the teaching/learning process.

Model Schools Program

The Model Schools Program. This program was undertaken to demonstrate the extent to which computer technology can improve instruction in schools and to explore how technology influences curriculum, school organization, and operations. Model Schools activities have included training teachers on appropriate applications of technology and technology-enhanced curriculum integration activities to incorporate tool software applications in instruction. Model Schools has also established a computer conferencing system to share the results of the program among teachers and has provided technical assistance to help school districts evaluate the effectiveness of technology.

Model Schools Technology Planning and Implementation Process

Model Schools Technology Planning and Implementation Process. A new BOCES shared service, the Model Schools Technology Planning and Implementation Process, was approved in June 1989. It will provide assistance to school districts on the development of a comprehensive plan for instructional and instructional support applications of technology.

TNT/Distance Learning

TNT/Distance Learning Grant Program. A TNT/Distance Learning Grant Program was offered in 1986 and 1987 to explore the impact of distance technology upon education and its relationship to the TNT System. Eighteen grants were awarded to BOCES and school districts for needs studies, implementation projects, and expansion projects. Planning is under way for a 1990-91 distance learning grant program.

Effective Schools, Reasoning and Computer Technology

Effective Schooling, Reasoning and Computer Technology. In 1984, the Division of Elementary and Secondary Education Planning produced a document on "Children as Thinkers" and how technology should be used to enhance the powerful dynamics of a "reasoning" curriculum. The document was a basis for the development of the Model Schools Program.

K-12 Curriculum Perspectives

K-12 Curriculum Perspectives on the Use of Computers in Schooling. The Regents *Action Plan to Improve Elementary and Secondary Education Results in New York* (1984) recommended that technology should be integrated as a tool within the curriculum. A committee of Department curriculum representatives was convened in 1984 to write perspectives on the appropriate use of computers for each curriculum area in response to their recommendation.

Resource Manual on the Use of Computers in Schooling. This manual,

developed in 1986 and revised in 1989 by the Bureau of Technology Applications, provides educators with timely information on the use of computers and related technology in schools.

Instructional Support Applications. Examples of instructional support applications of technology that use TNT telecommunications and database management capabilities include:

Integration of Library Systems. Pilot projects have been undertaken in two areas of the State to establish "models" to guide public and school library use of the statewide TNT network. Both projects are consistent with TNT long-range development for connectivity and the reduction of communications costs through network sharing.

Library System Integration

Youth-at-Risk Electronic Clearinghouse. Several Department Program Offices are collaborating on a design for a communications and information service that uses TNT capabilities for youth-at-risk, their parents or guardians, and coordinators of Youth-at-Risk programs.

Youth-at-Risk Clearinghouse

Community Schools Project. Approximately 15 buildings included in the Community Schools Project will be using TNT for communications purposes.

Community Schools Project

Electronic Computer Conferencing Applications. Statewide computer conferencing systems have been established to enable teachers to share information on programs, curriculum, and staff development.

Electronic Conferencing

Management Applications. Since 1984, the statewide Technology Network Ties (TNT) System has been developed that integrates computer hardware, software, and communications technologies in a comprehensive network of school districts, BOCES, libraries, other educational agencies and the State Education Department. The network serves all these applications areas.

Other TNT major projects include:

- *TNT Applications.* The current development of a comprehensive Student Information System (SIS) for statewide use has been coordinated with the Regional Information Centers to create a uniform student information system to enhance school district management of educational programs.

TNT Applications

Statewide Network

- *Network Access.* At present, the TNT backbone links the New York City Board of Education, the State Education Department and 12 Regional Centers; from this backbone, the network connects all BOCES and over half the school districts throughout the state. Figure 5 illustrates the statewide backbone of this network as well as the major local hubs which provide service to the local school districts.

Data Reporting

- *Efficient Data Reporting.* TNT's data base management system has been designed to generate required Department data reports as a consequence of day to day use of BOCES Student and Financial data processing services by building Data Depositories at each Regional Information Center for school districts.

Electronic Mail

- *Electronic Messaging.* The use of IBM Corporation's Professional Office System (PROFS) electronic mail has rapidly expanded over TNT and currently includes over 3,000 individual accounts.

The development of SIS and the transfer of data over TNT have raised a number of critical policy issues related to security and confidentiality of information. Consequently, the Board of Re-

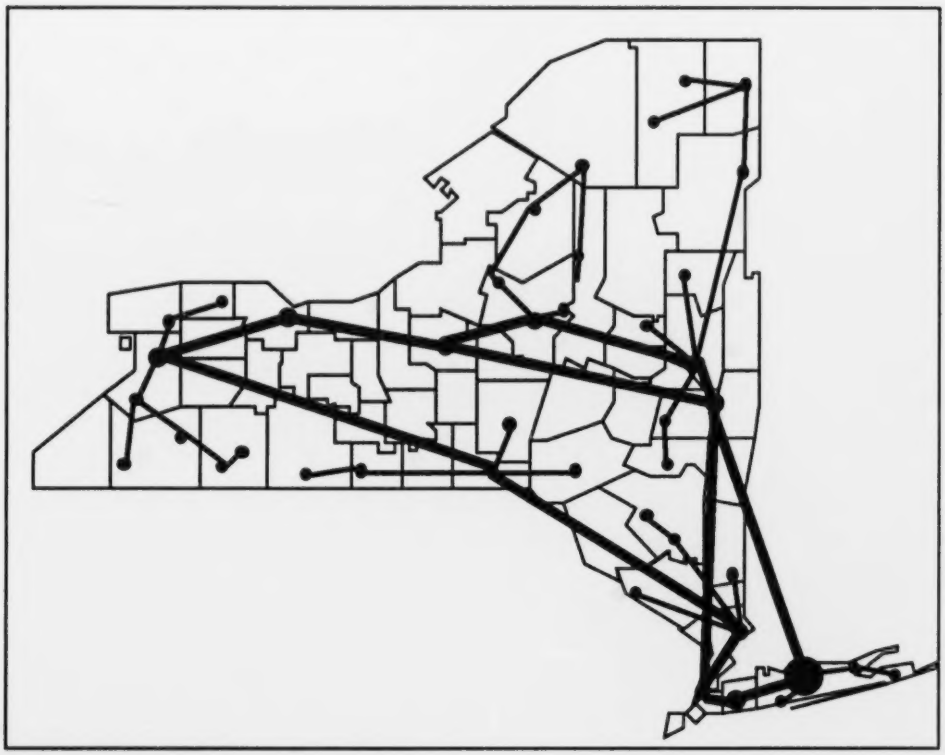

Figure 5. TNT Network, 1985-89

gents unanimously approved four major policies for the collection, analysis and maintenance of security of student data in January 1989 (see Appendix).

In addition to TNT development projects, two other programs that address management applications are:

Comprehensive Instructional Management System

- *Comprehensive Instructional Management System (CIMS).* CIMS is a systematic approach to education that includes a curriculum development process, assessment instruments, and staff development strategies. While not a technology program, CIMS has produced technology-based curriculum components and used computer technology in the assessment process.

Excellence and Accountability Program

- *Excellence and Accountability Program (EAP).* The Department is selecting approximately 100 school districts as pilot sites for EAP. These districts will use the TNT network for accountability purposes.

The preceding context of current technology-related programs, resources and applications has served as a foundation for the development of the vision of the future of technology use in schools.

III. ASSUMPTIONS

The following major assumptions underlie the early "Vision of the Future." While there are many other assumptions, these were appropriate for the "Vision" because they focused on the key educational dimensions rather than technology itself.

1. Instructional applications of technology will enable students to acquire skills that increase both their post-high school employability and potential to attend college. Technology will enhance student motivation to learn.

Students will gain useful skills

2. Teachers and school administrators will play critical roles in attaining the "Vision of the Future." In their hands, the "Vision of the Future" becomes real and alive for their students. Curriculum and staff development supporting teachers and administrator use of technology therefore become critical elements in accomplishing the "Vision of the Future."

Teachers, administrators play critical roles

3. Teachers and school administrators will need comprehensive staff development programs to use computers and other educational technology as tools to support instructional programs, the instructional process, the curriculum and management decisions.

Staff development needed

4. The need for comprehensive technology planning at local, regional and State levels will be increasingly vital in the next decade.

Technology planning increasingly important

5. A planning committee will need to be formed at the local school district level to develop comprehensive technology plans and programs. The planning committee should be

Planning committee at the local level

composed of representatives of the entire educational community, including teachers, administrators, local Boards of Education, parents, taxpayers and local community/ business institutions.

State Education Department encourages planning

6. The State Education Department will need to exercise a "leadership role" by encouraging local school districts to form planning committees for developing technology plans and programs.

Teachers play critical role in planning

7. Teachers will play a central role in planning for technology and their involvement will be required for their continued support for technology in schools. Teachers who serve on a local planning committee must be representative of all the teachers throughout the district. Teachers should be designated to serve on the planning committee by their collective bargaining agent to ensure representation of all teachers.

CIMS will expand

8. The Comprehensive Instructional Management System (CIMS) program, including the development of technology-based CIMS components, is a powerful approach, and will expand throughout New York State School districts.

Tool software use increases

9. The use of tool software in the curriculum and the teaching/ learning process will increase while there will be a decline in computer-assisted instruction, except where needed for remediation, drill and practice.

Training on technology integration needed

10. The Model Schools Program for training teachers on the use of computer tools and the development of plans to integrate technology within the instructional process will expand throughout the State's schools.

Software tools to impact on classroom

11. The use of the computer for teaching students critical thinking and problem solving skills will expand, due to the introduction of new software tools that more closely approximate human cognitive processes.

Hardware and software usable by disabled

12. Software and hardware will be adapted to allow access by users with special needs whether students, teachers, administrators or others with disabilities.

Video use to expand

13. Student and teacher use of video programming and low-cost, in-school video production for instruction will expand.

Television use increases

14. Access to educational video resources from public television, cable television and other sources will expand.

15. Technology industries will develop computer- and media-base presentation and learning systems. Although initial costs may be high, or applications limited due to hardware/software requirements, these problems will recede as technology improves and applications increase.

Presentation systems improve

16. The increasingly complex and rapidly changing environment that educational personnel face now and in the next decade will require that information be easily accessible to support informed, timely decision making.

Information must be easily accessible

17. The use of technology to provide a basis for informed management decision making is a prerequisite for successful integration of technology into instructional and instructional support programs in schools.

Informed management required

18. Use of networked computer workstations to support instructional and management decision making will rise.

Network use rises

19. The use of the Student Information System (SIS), including the Part 200 Management System component of SIS, and the Financial and Administrative Management for Education (FAME) program will provide teachers and administrators with communications capability and information for informed decision making.

SIS, Part 200 & FAME prove useful

20. The Regents will continue to require timely school district reporting of school and student achievement data, enrollment and drop-out statistics, fiscal and program monitoring information. TNT and the Student Information System (SIS) will continue as cost-effective, secure and reliable systems for gathering and transmitting these data.

TNT/SIS continues to meet Regents' reporting requirements

21. The need for valid and reliable impact data on technology applications for instruction and management will not abate.

Technology impact data needed

22. The cost of small, powerful computer workstations and other educational technology will decline. However, software, personnel, and telecommunication costs will increase.

Technology costs down; other costs up

23. Use of distance learning for instruction and staff development will increase, particularly among citizens, schools and communities located in rural, geographically isolated regions of the state.

Distance learning use rises

24. The increasing demand for information and the management

New policies on information needed

and use of information resources will create new policy issues related to privacy, security and identification.

BOCES remain cost-effective

22. BOCES will remain a cost-effective alternative for delivering instruction, instructional support and management services to schools. BOCES will also remain an effective vehicle for planning and support of technology.

New partnerships formed

23. New partnerships between educators and the technology industry will be forged to implement the *Long-Range Plan*.

Fiscal support for TNT/SIS continues

24. The Executive Office and the New York State Legislature will continue to value and therefore provide sustaining fiscal support for TNT/SIS and additional resources required to implement fully the *Long-Range Plan*.

IV. VISION OF THE FUTURE

The following is a synthesis and reorganization of the early "Vision of the Future" paper based upon extensive field evaluations provided by the different constituencies who reviewed the paper during the summer of 1989.

It should be noted that some of the future examples of technology include such phrases as "other school staff, related personnel, and other school-based and non-school-based staff." These phrases refer to such educational professionals as school librarians, media specialists, vocational rehabilitation counselors and other professional staff who provide a wide variety of educational services to students and schools, but do not serve as classroom teachers.

School/learning environments will reflect the following in 1995, *provided appropriate planning takes place to integrate current and emerging technology applications within the entire educational enterprise.*

THE STUDENT DIMENSION — Students would have:

Daily access to integrated learning environments

- Daily access, where appropriate, to technology-rich learning environments within their classrooms and in separate learning labs outside the classroom, in the school library media center, or from home when needed. Schools would blend student learning outcomes and activities across the disciplines and provide for interdisciplinary learning. These schools would provide a holistic view of student needs (diagnosis) and student progress. Schools using technology to pursue excellence would respond well to the special learning needs

of students (including remedial, at-risk, handicapped and limited English proficient students) and accelerate their education as appropriate.

Access to library resources

- Access to library and multimedia resources wherever they might be located.

Use of multi- and hypermedia

- Daily use of multi-media and conceptually-linked (hypermedia) data environments, composition and production learning environments located in classroom and school library media centers. Multi-media and hypermedia applications would be integrated within and across all curriculum areas.

Daily access to tool software

- Daily access to computer-based tool software and tool-based lessons that integrate the computer into the entire instructional program.

Networked workstation

- Access when needed to networked systems extending from the classroom to the building, to the district, to the region, to the entire statewide Technology Network Ties system and beyond. The capabilities available through this integrated network will include database resources, electronic forms of sharing such as computer-based conferencing and electronic mail, and special applications such as simulations, visual and graphical databases and distance learning.

Portable workstation for home use

- Access to portable computer systems for use at the student's desk, as well as at home, for homework and other assignments that use tool software.

Access to instructional resources

- Access to educational resources and services through networks, such as libraries, museums, postsecondary institutions, and public television resources.

Global peer network

- Enhanced global communications with peers across geographical regions through networks for undertaking joint learning projects and other collaborative educational activities.

THE TEACHER DIMENSION — Teachers would have:

Participation in planning and implementation

- Full participation and partnership in the planning and implementation of technology programs and support systems. Their participation will be made possibly by having teachers serve on local technology planning

committees with other representatives of the entire educational community. Teachers who serve on the planning committee should be designated by their collective bargaining agent to ensure that they are representative of all teachers throughout the school district. The participation of teachers on the planning committee will enable teachers to determine how best to implement technology to improve instruction and to enhance productivity and efficiency.

- A workstation in each classroom, linked to the network, that would provide classroom management support for grade books, student grades, attendance, and lunch money. In addition, the workstation would provide teacher access to student achievement information and reports on individual student and class progress. The workstation would allow teacher management of instructional delivery, and electronic review of student work and overall program accountability. This information enables teachers to better target instruction to the whole class, small group, and the individual.

Network support for classroom management

- A portable workstation for use both in the classroom, as well as at home for connecting to the network.

Portable workstation for use at home

- Access to the network allowing teachers and other school staff to interact electronically with their colleagues in the same building, or across the State, in order to identify special resources or share effective methodologies. Within the building, the networked workstation allows teachers and related personnel to better control the articulation of curricula and to coordinate the delivery of instructional, counseling and other educational services, especially to special needs students such as students with disbilities, students in remediation outside the classroom, or those in multiple programs.

Curriculum and resource network

- Access to the network, via the workstation, allows teachers and other school-based and non-school-based staff to share information with their colleagues, regardless of their location. This would reduce the isolation of teachers in special subject areas and of specialized personel such as rehabilitation counselors.

Teachers' network

- Access to databases of resource materials, lessons and evaluative data on various instructional strategies—all

Access to networked resources

searchable and accessible by teachers and other school staff from school and home.

Access to distance learning

- Access to distance learning and other technology-based delivery-systems for staff development that provide a means for teachers and other school staff to develop new skills and pursue advanced course work, regardless of location.

Training and support

- Access to comprehensive training, staff development and support capabilities for integrating technology into the curriculum.

THE ADMINISTRATOR DIMENSION—School administrators would have:

Use of networked systems

- Access to a networked workstation, as well as a portable workstation for use at home. Network access would provide the full set of network capabilities, including electronic communications and document transfer both within any organization, as well as between peers in the district and across the State.

Management support applications

- Access to a full complement of computer applications to support the fiscal, personnel and student information functions of school management and accountability. Prerequisite to effective use would be a comprehensive, historical database, as well as the appropriate computer software tools for query and analysis of information. The systems would support Part 100 and Part 200 requirements for students, promote integration of these systems with related systems, such as the system to provide vocational and educational services to individuals with disabilities and allow for a better match between student needs, intended learning outcomes for those students and available resources.

Program monitoring and evaluation

- Availability of valid and reliable program monitoring and evaluation processes to guide decisions about program appropriateness and effectiveness, particularly with respect to programs using technology.

THE SCHOOL DIMENSION — The school building would provide:

Equitable distribution of technology

- Equitable distribution of and access to computer-based systems, as well as other technology.

- Fully networked classrooms and school library media centers with access to interactive video and computer-based learning systems. *Networked classrooms*

- K-12 building-level and subject-level plans for the integrated use of technology that take advantage of the New York State Comprehensive Instructional Management System (CIMS) program, where appropriate. *Integrated use of technology*

THE DISTRICT DIMENSION—School districts would provide:

- Fiscal support for implementing technology in a coordinated manner. *Fiscal support*

- A strategic, curriculum-based plan for technology that is consistent with regional and State plans. *Comprehensive plan*

THE COMMUNITY DIMENSION — The community would provide:

- Collaborative support and participation of parents, taxpayers, institutions and others in planning for the implementation of technology. *Collaborative support in planning*

- Fiscal and human resource support for technology applications. *Support for technology applications*

- New partnerships between cultural/social institutions, the business community and education that support technology initiatives. *New community partnerships*

- Technology-based services and resources such as those available from public television, community-franchised cable television operators, libraries, museums and industry. *Technology-based services available*

THE STATEWIDE DIMENSION—The statewide system would include:

- A comprehensive, integrated, cost-effective communications network that provides all educators with the capability for electronic communications, document sharing plus complete, easy access to resources and educational services, including access to other State and national network services. *Statewide communications network*

- An electronic reporting system that allows all required State reports to be entered and submitted electronically *Electronic reporting system*

from each district into regional databases that are accessible by the Education Department.

Funding strategies encourage plans

- Funding strategies that support district and regional planning, and ensure coordinated approaches to technology implementation.

THE ORGANIZATIONAL DIMENSION—A restructured educational system would provide:

More options for teachers and administrators

- New laws, regulations, policies and fiscal mechanisms that will provide enhanced flexibility and discretion to teachers and administrators for exploiting the full capabilities of emerging technologies.

New roles for teachers and administrators

- New roles for teachers and administrators that allow for greater innovation and fuller participation in planning and managing education.

More options for teachers and students

- A wider range of options for participation of students and teachers in education that are not dependent upon time requirements and classroom settings.

New partnerships

- New partnerships among a variety of educational sectors and community organizations that will provide well-articulated resources, programs and services.

V. CRITICAL ELEMENTS

The early "Vision" paper proposed several critical elements required to implement all of the dimensions. These critical elements address the entire range of technology applications for instruction, instructional support and management. The critical elements are presented in the order of importance assigned to them as a result of the evaluation process.

1. Provision of appropriate and effective staff development services to all teachers and administrators throughout the State. *Staff development*

2. Provision of sufficient and appropriate funding and aid (including BOCES aid) for plans approved by the State Education Department as consistent with the overall system architecture and the vision of the future. In addition, the re-direction of existing fiscal and personnel resources and the acquisition, as necessary, of new fiscal resources. *Sufficient funding for plans*

3. Encouragement of effective, cooperative planning. *Effective planning*

4. Provision of common database software and database tools accessible from a wide variety of hardware systems. *Common database software*

5. Provision of a statewide telecommunications network with a clear architecture for defining how to interconnect systems at the regional, school district and school building levels. *Statewide telecommunications network*

6. Provision of standards and protocols for ensuring integration, as well as a common development and applications environment. *Common environment*

Collaboration and partnerships

7. Collaboration and partnerships among all educators and business and community resources focused on improving instruction delivered via the school.

Statewide student database

8. Establishment of a statewide student database which would provide a student profile for following the student throughout his/her career anywhere in the New York State educational system.

Evaluation Results

Field constituencies expressed strong agreement with all of these critical elements; however, the need for training, funding and planning received higher average ratings than the other elements (see Figure 6).

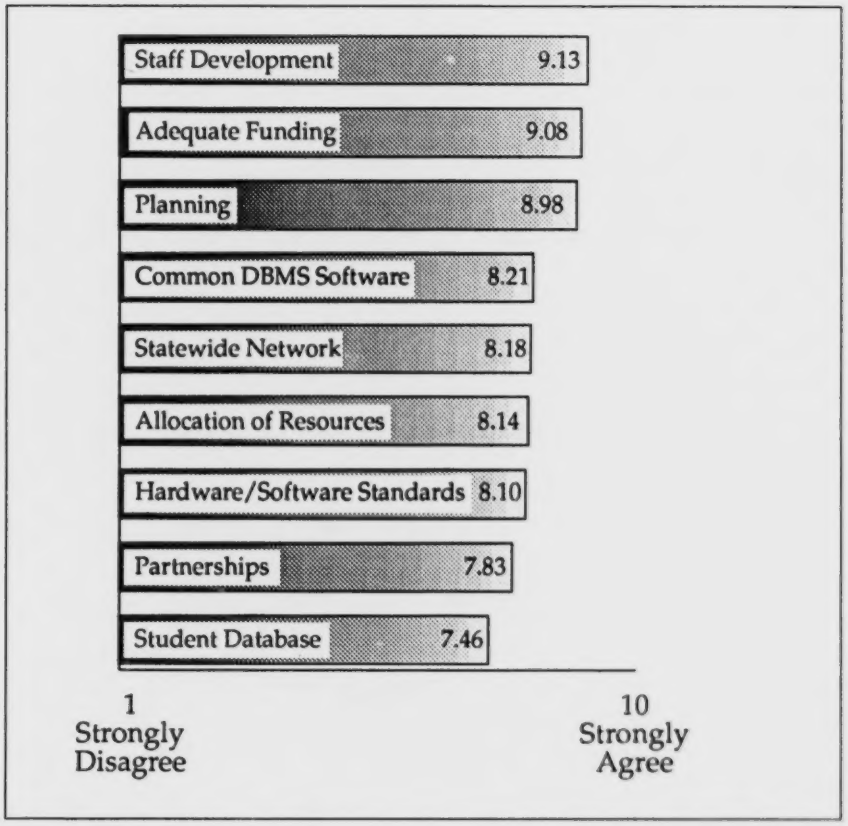

Figure 6. Average ratings of critical elements presented in the "Vision of the Future" paper (total respondents = 494).

VI. IMPEDIMENTS

The following impediments to implementing the *Long-Range Plan* were identified by the constituencies who reviewed the early "Vision" paper. They are presented in order of importance based upon their frequency of being mentioned by reviewers.

1. **Insufficient Funding.** Nearly one-half of the respondents indicated that the lack of adequate funding for planning, training, technical support, hardware and software, and access to the TNT network would represent the major impediment to implementing the *Long-Range Plan*.

Insufficient funding

2. **Inadequate Provision of Training and Technical Support.** Another major impediment identified by the field would be the lack of adequate training of teachers and administrators (at both in-service and preservice levels) to ensure appropriate utilization of technology applications.

Inadequate training and technical support

3. **Lack of Involvement of Local School District and BOCES Personnel, Local Boards of Education, and the Community in Implementing the *Long-Range Plan*.** The respondents indicated that it is critical to fully involve local school district and BOCES teachers, administrators, students, local Boards of Education and the wider community in planning and implementing the *Long-Range Plan*. Perceived disenfranchisement by these constituencies could impede implementation of the *Plan*.

Perceived disenfranchisement

4. **Teacher Acceptance.** The respondents emphasized that local teachers must be fully involved in planning and implementation of the *Long-Range Plan* to overcome their potential resistance to technology.

Lack of teacher support

Inequitable access to technology

5. **Equity and Access.** Disparities in wealth among school districts would impede the implementation of the *Long-Range Plan*. Field constituencies indicate that funding will need to be specifically targeted at low wealth districts to ensure that hardware and software is accessible to all school districts.

Hardware/software incompatibility

6. **Incompatible Hardware and Software.** Lack of compatibility between school district software and hardware and software standards required for connecting to the TNT network and reporting management data pose potential impediments. Local school districts would be hesitant to implement the *Long-Range Plan* if their current technology is rendered obsolete.

Lack of support for planning

7. **Insufficient Support for Planning.** Failure to provide fiscal and human resources to support local, regional and Statewide planning could impede the implementation of the *Plan*.

Data confidentiality and security

8. **Security and Confidentiality of Data.** Procedures will be required to ensure the confidentiality and security of data on students. The January 1989 Regents policies for the collection and analysis of student data addressed this concern.

Many other individual impediments were mentioned by the reviewers, but there was no common focus that emerged from these comments.

VII. ACTION RECOMMENDATIONS

Introduction: This section includes four major action recommendations proposed for approval by the Board of Regents for the implementation of the *Long-Range Plan for Technology in Elementary and Secondary Education in New York State*. The recommendations are comprehensive, interrelated and should be undertaken simultaneously. The first two action recommendations are central to integrate technology within the teaching/learning environment and to implement the technical capabilites and staff development services to provide access to the Statewide network for all teachers, students and administrators. The third recommendation includes planning initiatives needed for effective coordination and utilization of technology. The last recommendation includes procedures for assessing the effectiveness of the impact of technology throughout the schools.

All recommendations are of equal importance for the full implementation of the *Long-Range Plan,* and all received substantial support from field constituencies (see Figure 7). The first recommendation provides for the full integration of technology within the classroom for instructional applications and comprehensive staff development to enable all teachers to use technology effectively. The second recommendation implements the major technical capabilities to provide network access to all school buildings. While it also installs the capability for administrator access to TNT/SIS, it should be understood that this communications capability is required for teacher/student access, addressed in the first recommendation.

Although there is a major focus on management and instructional support applications of technology in the

recommendations, particularly recommendation two, an attempt has been made to balance these applications. it is a premise of the *Long-Range Plan*, however, that effective instruction — which requires the ability to identify students' needs and evaluate student progress — must be based upon a comprehensive information system using the best management support technology available. This capability must be in place throughout New York State's educational system to enable students and teachers to use available and emerging instructional technologies effectively.

Each recommendation includes a series of implementation strategies that address the need for funding and specific steps for implementing the recommendation. The recommendations and specific activities are those required to implement all "Vision" dimensions within a five-year period.

As noted in Chapter I, field constituencies who reviewed the *Plan* expressed positive agreement with each of the four major action recommendations (see Figure 7).

The options to implement aspects of the *Plan* that are of highest priority, based on the evaluation results, are presented in Chapter VIII.

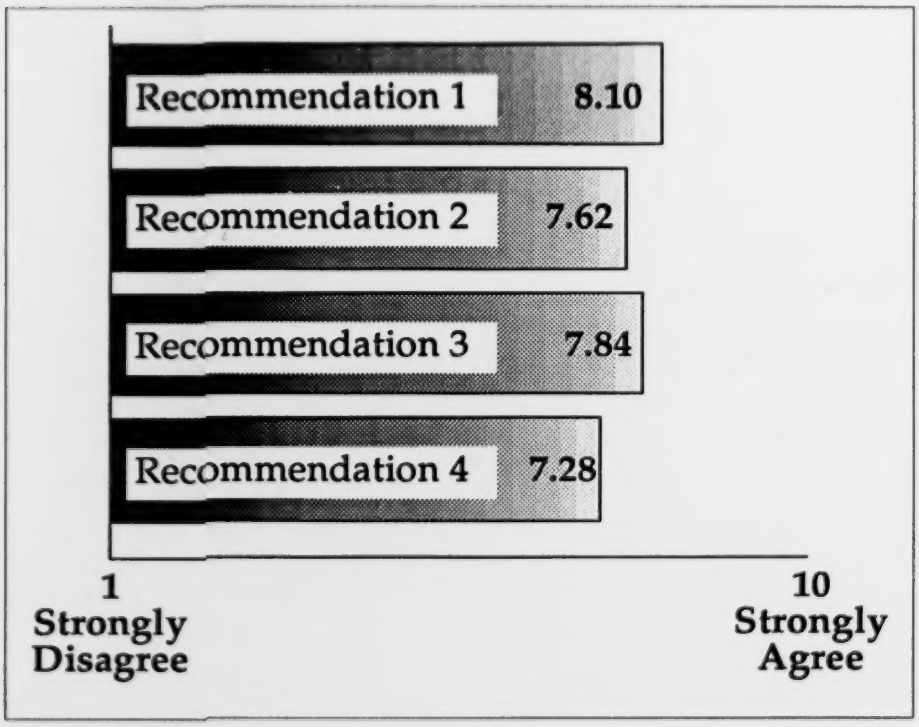

Figure 7. Average ratings of the four action recommendations in the *Long-Range Plan* (total respondents = 745)

Action Recommendation 1:

The Regents support the complete integration of technology into the teaching/learning environment of schools and the establishment of teacher and student access to the telecomunications capabilities of the Statewide TNT network and other network services.

Rationale:

Technology-rich classrooms are fundamental to the *Long-Range Plan for Technology in Elementary and Secondary Education in New York State.* What happens in classrooms throughout the State has implications for society and the economy. Thousands of students leave school without graduating. These students are not readily employable nor can they comfortably attend post-secondary schools without remediation. It is imperative, therefore, that everything possible be done to motivate students to graduate from high school and to ensure that they have the skills to be productive members of society. The costs of not doing so are too high.

The added benefits of using technology in classrooms are becoming clear to most educators. Students using technology in their subject areas learn skills that increase both their post-high school employability and potential to attend college. This opportunity cannot be lost. Technologies, including computers, broadcast television and video playback machines, are known to increase student motivation to learn. Therefore, the combination of motivation and learning relevant, transferable new skills has great potential to keep students in school through graduation.

Classroom-based technology also positively affects teachers. It revitalizes classroom presentations and helps teachers better manage their learning environments. New communications technologies reduce teacher isolation through increased sharing of curriculum ideas and approaches to teaching particular subjects and students.

School improvement and reform supported by technologies are a significant force in education. All recommendations in the *Long-Range Plan* are designed to enrich and enliven the pursuit of excellence in education.

Implementation Strategies/Steps:

The Regents request the State Education Department to prepare

a comprehensive package of legislative proposals to seek funding and requested changes in law/regulations to implement Recommendation 1.

The Regents recommend that the following be undertaken to implement Recommendation 1:

- Develop Regents policies for involving teachers in all aspects of implementing the *Long-Range Plan*.
- Provide comprehensive staff development to all elementary and secondary teachers focusing on:
  - ✣ Accessing the statewide system of electronic communications and resource sharing.
  - ✣ Utilizing computer conferencing and the use of integrated tool software packages.
  - ✣ Effectively managing technology-enhanced teaching/learning environments.
  - ✣ Using the Student Information System, including the Part 200 Management System component, to improve decision making about educational programs for all students.
- Provide funding for the current Model Schools Program to support the development of *advanced* tool software curriculum applications.
- Expand and replicate the Model Schools Program throughout the State.
- Disseminate Model Schools Program products, including technology-based lesson plans throughout the State.
- Replicate the Comprehensive Instructional Management System (CIMS) throughout the State.
- Disseminate CIMS curriculum products, including technology-based components, throughout the State.
- Collaborate with industry on the development of new models of technology use in the classroom incorporating components of Model Schools, CIMS, and such other models as Apple's Classroom of Tomorrow® and IBM's Teaching and Learning with Computers®.

- Provide a Distance Learning Grant Program for staff development and appropriate areas of instruction.

- Encourage appropriate uses of classroom learning technology for staff development and other applications.

- Complete the Youth-at-Risk Electronic Clearinghouse and Computer Conferencing System and provide access to all teachers, in support of education of at-risk students.

- Expand use of computer conferencing on the statewide network, and extend access to other network services.

- Complete current pilot projects designed to provide models for the integration of all library systems within the TNT network. Wherever appropriate, expand the library model to other areas of the State.

- Collaborate with Teacher Resource and Computer Training Centers, BOCES, and school districts on the development of curriculum and staff development models, procedures and materials to integrate technology within the teaching/learning environment.

- Develop Regents policies for instructional support and instructional technology applications.

- Develop policies and procedures that allow student use of the telecommunications capability of TNT while maintaining security and confidentiality of the Student Information System.

- Collaborate with the Department's Office of School District Organization on a review of BOCES law to determine if teacher connectivity to TNT can be supported by BOCES aid.

- Develop new Regents policies related to the use of technology in testing and curriculum development.

- Develop policies for the use of instructional hardware and software aid.

- Acquire and install the following recommended technical capabilities to establish teacher/student access to the statewide network and classroom use of the technology:

- An instructional local area network (LAN) at each school building. The instructional network will be part of the overall school building LAN and provide access to the statewide network for identifying special resources and sharing methodologies. Within the school building, the local network will enable teachers to electronically communicate with colleagues. The network will also provide teachers access to computer-based classroom management support, access to student achievement data, and teacher management of instructional delivery.

  The LAN may include installation of wiring in each classroom to connect stationary and portable teacher and student workstations, an instructional file server at each school building, and printer.

- An advanced teacher workstation able to demonstrate lessons to the class or small group in each elementary and secondary classroom.

- Five student workstations for each elementary classroom and seven student workstations for each secondary classroom to access resources, electronic communications, tool software, simulations, and visual and graphic databases.

- Five portable student workstations for each elementary classroom and ten portables for each secondary classroom.

- A portable workstation for each elementary and secondary teacher to use in school or to connect to the network from home.

- Integrated instructional tool software package for teachers and students that includes word processing, graphics, spreadsheets, data base management applications, and interfaces with the LAN, where appropriate.

- CD-ROM and videodisc resources in each elementary and secondary building to access information, visual and graphic images, and databases.

- A television set and a video cassette recorder/player in each elementary and secondary classroom for use of video resources.

- A satellite reception capability (at each school district) to provide staff development opportunities for teachers and administrators.

This is a recommended hardware/software configuration and may ultimately vary to some extent based on individual school district needs and technnical capacities.

- Expand the use of video in the classroom, including broadcast television and video resources available through BOCES and the Department's Media Distribution Network.

- Develop media-based materials to train teachers and students.

Recommendation 2

The Regents support the development of technology systems, including the completion of the development of the Statewide TNT System, the Student and Financial database management applications, and connection of all school buildings throughout the State for communications, sharing and reporting purposes.

Rationale

In January 1989, the Board of Regents formally approved a series of policies that underscored the crucial need for TNT/SIS and the critical importance of information for educational management and decision making.

- The Regents support the database and network standards established within Technology Network Ties and the Student Information System component as *the foundation for the educational decision-support system.*

- The Regents support the position that the appropriate use of technology can substantially enhance schools' ability to support management and instructional decision making.

- The Regents endorse the Technology Network Ties/Student Information System as the method to provide more information to teachers and administrators, via technology tools that support decision making.

Recommendation 2 derives from these Regents policies and is central to implementing several of the major "Vision of the Future" dimensions.

Recommendation 2 requires the connection of all school district buildings throughout the State to the TNT network and the implementation of the required technical capability and training to provide all school administrators and, ultimately, teachers and students, access to SIS and other database management applications.

Implementation Strategies/Steps:

The Regents request the State Education Department to prepare a comprehensive package of legislative proposals to seek funding and requested changes in laws/regulations to implement Recommendation 2.

The Regents recommend that the following be undertaken to implement Action Recommendation 2:

- Complete the development and piloting of the Student Information System (SIS), including the Part 200 Management System, and the Financial and Administrative Management for Education (FAME) system developed within the context of TNT policies, standards and protocols in order to better serve all students and adults in the State.

- Utilize the Part 200 System in new ways, such as to transfer educational progress information to adult service providers for students with disabilities.

- Install on a statewide basis SIS, including the Part 200 Management System and the FAME system at each of the BOCES Regional Information Centers (RIC), to provide access to all school districts and buildings.

- Complete the development of the Regional Data Depositories at each BOCES Regional Information Center. The Regional Data Depositories will enable school districts to efficiently generate required Department reports as a result of their day-to-day use of BOCES Student and Financial data processing services.

- Acquire and install the necessary hardware upgrades and modifications at each BOCES Regional Information Center required for connecting all school buildings within each RIC service region to the Statewide network.

- Provide fiscal support to maintain and upgrade the TNT network infrastructure as technology evolves.

- Review the January 1989 Regents policies for statewide information systems and revise as appropriate based upon Regents recommendations in the *Long-Range Plan*.

- Work with the Department's Office of School District Organization to examine BOCES law and current shared services to determine what revisions may be required to support the *Long-Range Plan*.

- Acquire and install the following recommended technical capacities to connect every school building to the statewide network:

- ✣ An administrative local area network (LAN) at each school building, providing administrators with electronic communication and other management applications within the building and throughout the district. This may include some combination of the following: a communication host, modems, telephone lines, wiring, a computer file server, software and printer.

- ✣ A stationary administrative workstation at each building for use by administrative personnel.

- ✣ A portable workstation to allow each school administrator to access the network from school or home.

- ✣ Integrated administrative tool software to include word processing, spreadsheets, graphics, telecommunications, and the capability to generate reports. The package would support management applications and connect with the Student Information System (SIS), the Part 200 Management System, and the Financial and Administrative Management for Education (FAME) system.

This is a recommended hardware/software configuration and may ultimately vary to some extent based on individual school district needs and technical capacities.

- Make available at each school district a technician to plan, oversee, maintain and monitor acquisition and installation of hardware and software to implement this recommendation.

- Provide funding at the school district level to install, maintain and support use of hardware and software for this recommendation.

- Provide comprehensive staff development to all school administrators to use TNT/SIS and other information data bases.

- Develop media-based materials to train school administrators.

- Establish partnerships with technology industries to demonstrate the "Vision of the Future."

Action Recommendation 3:

The Regents approve the development and implementation of planning procedures and support activities for complete technology integration at the local, regional and State educational levels.

Rationale:

The development of local school district, regional and State planning models and support activities are critical to implementation of the *Long-Range Plan*. The strategic importance of information, the rapidly changing technological environment, and the substantial cost for implementing technology systems establish the clear need for technology planning. The integration of the range of technology applications for instruction, instructional support and management requires quality planning.

It is vital that the State Education Department encourage and provide statewide direction and assistance to help school districts and BOCES apply systematic planning procedures for the future application of technology. Most important, the development of plans for school improvement, especially when technology is involved, must be undertaken at the local school building and district levels. It is equally important to ensure that there is an articulation between local and regional planning initiatives. The January 1989 Regents policies for Statewide Information Systems underscored the need for technology planning:

> The Regents support the position that planning for the use of technology is critical to facilitate the management of school districts and to utilize the computer in the support of instruction. School districts must initiate and sustain a coordinated planning effort in order to effectively use technology.

The State Education Department will need to encourage local school districts to develop planning committees that are representatives of the entire educational community. The planning committee should be composed of teachers, administrators, local Board of Education members, parents, taxpayers and other community representatives to ensure broad-based collaborative support.

Teachers who serve on the planning committee should be

designated by their collective bargaining agent to ensure that they are representative of all teachers throughout the district and to maintain their continued support for technology planning.

Recommendation 3 derives from this Regents policy. The Office of Elementary and Secondary Education Planning, Testing and Technological Services has implemented planning and support initiatives at the local school district, regional and State levels.

Implementation Strategies/Steps:

The Regents request the State Education Department to prepare a legislative proposal(s) to seek funding and changes in laws/regulations to implement Recommendation 3.

The Board of Regents recommend that the following activities be undertaken to implement Action Recommendation 3.

- Expand pilot testing of the School District Information Study (SDIS) planning model to encourage local school districts to plan management uses of technology.

- Expand pilot testing of the Technology Planning for Improving Schools (TPIS) model to encourage school districts to plan instructional support and instructional uses of technology.

- Provide funding to school districts for comprehensive technology planning including seeking legislative changes to existing hardware/software aid to allow for technology planning.

- Encourage the formation of a planning committee at the local level composed of representatives of the entire educational community.

- Establish application procedures, criteria and guidelines for all technology funding programs available to school districts that require the establishment of a planning committee and require that teachers who serve on the committee be designated by their collective bargaining agent.

- Develop appropriate changes in the Chapter 793 Planning Process to ensure that BOCES computer management, instructional support, and instructional services provide

comprehensive support to school districts to implement *Plan* recommendations.

- Collaborate with the "Big Five" Cities School Districts to develop planning procedures for delivering computer-based services that reflect *Plan* recommendations.

- Implement a pilot project or projects to help BOCES and school districts develop alternative approaches and procedures for improving coordination of services to support school improvement using technology.

- Continue to encourage building, district, regional and State-level planning and the linking of this planning to various funding programs.

Action Recommendation 4:

The Regents direct the State Education Department to develop policies and procedures for Statewide monitoring and evaluation of the implementation of the *Long-Range Plan* and the tracking of technology-based efforts and expenditures in order to document their effectiveness.

Rationale:

The *Long-Range Plan* is a comprehensive approach to school improvement relying extensively on technology. Given the scope, significance, and projected cost of the *Long-Range Plan* , the Regents and the Department must monitor and evaluate all aspects of its implementation. The Department will need to collect and document information on the extent to which the *Long-Range Plan* is implemented, whether or not the intended technological capabilities are realized in a timely fashion, and the effect the implementation has on Department and BOCES professional and support personnel in school districts, students, parents and the State's economic sector, including employability of students and revitalization of industry.

Appropriate precautions and level of impact will be carefully designed to ensure that the evaluation does not burden school operation.

Implementation Strategies/Steps:

The Regents request the State Education Department to prepare a legislative proposal to seek funding and changes in laws/ regulations necessary to implement Recommendation 4.

The Regents recommend the following activities be undertaken to implement Action Recommendation 4:

- Establish representative steering committee to monitor implementation of evaluation plan.
- Evaluate BOCES 793 Plans for consistency with the *Long-Range Plan* and implement revisions to the process as necessary.
- Review and evaluate Department COSERs and technology special legislative grants contributing to accomplishment of *Plan* objectives.

- Review evaluation of the Regents *Action Plan* (1984) to determine impact of the *Long-Range Plan*.

- Develop and implement "quality control" procedures for school district plans for technology in education, including implications for State Aid.

- Require school districts spending over a certain proportion of their budget on technology to have their plans reviewed for consistency with State objectives for technology in education. Maintain records of these plans at BOCES and have Department personnel review these plans biannually.

- Conduct a brief annual survey of all school administrators to determine access to the full capabilities of the statewide network.

- Conduct representative annual survey of school teachers to determine access to the full capabilities of the statewide network and to the full complement of technology-enhanced classroom resources intended in the "Vision of the Future."

- Survey technical staff of statewide network to determine system integrity, including security, response time, "down time," recovery time and status of applications development and installation.

- Work with Department Offices for support of and contribution to their technology programs to accomplishing *Plan* objectives.

- Put in place appropriate documentation and evaluation processes at the local, regional and State levels to determine the extent to which technology implementations are impacting the teaching/learning environment.

VIII. RECOMMENDED OPTIONS

The scope of the *Long-Range Plan for Technology in Elementary and Secondary Education* is extremely comprehensive. Department staff are aware of the difficulties that the *Plan*, including all of the activities for complete implementation in a five-year period, presents to those who must implement it. The shared "Vision of the Future" has been translated into a set of recommended action steps for implementing the *Plan*. There are a myriad of alternatives for implementation. These include alternative timelines for implementation, new collaboration among constituencies and priority selection of implementation activities.

In the September 1989 draft *Long-Range Plan* version, full implementation models for each of the four recommendations were provided as well as a series of three suggested implementation options for each recommendation.

For each recommendation, the series of three suggested options were as follows:

Option 1 — Implement the full recommendation, including all of the identified activities, by 1995.

Option 2 — Implement the full recommendation, including all of the identified activities, by 2001.

Option 3 — Implement only those activities of a recommendation that reflect Regents/Department priorities by 1995.

Option 1 has the desirable effect of implementing all of the "Vision of the Future" dimensions within a short timeframe. However, the fiscal resources required would be extremely prohibitive.

Option 2 includes the implementation of all activities suggested for each recommendation, but extends the timeframe over a decade. This option would seriously delay the integration of technology within the teaching/learning environment and the provision of access to TNT for many school districts throughout the State.

Option 3 focuses only on those critical activities that are required to implement each recommendation within a more reasonable timeframe of five years and at a more reasonable level of required fiscal resources.

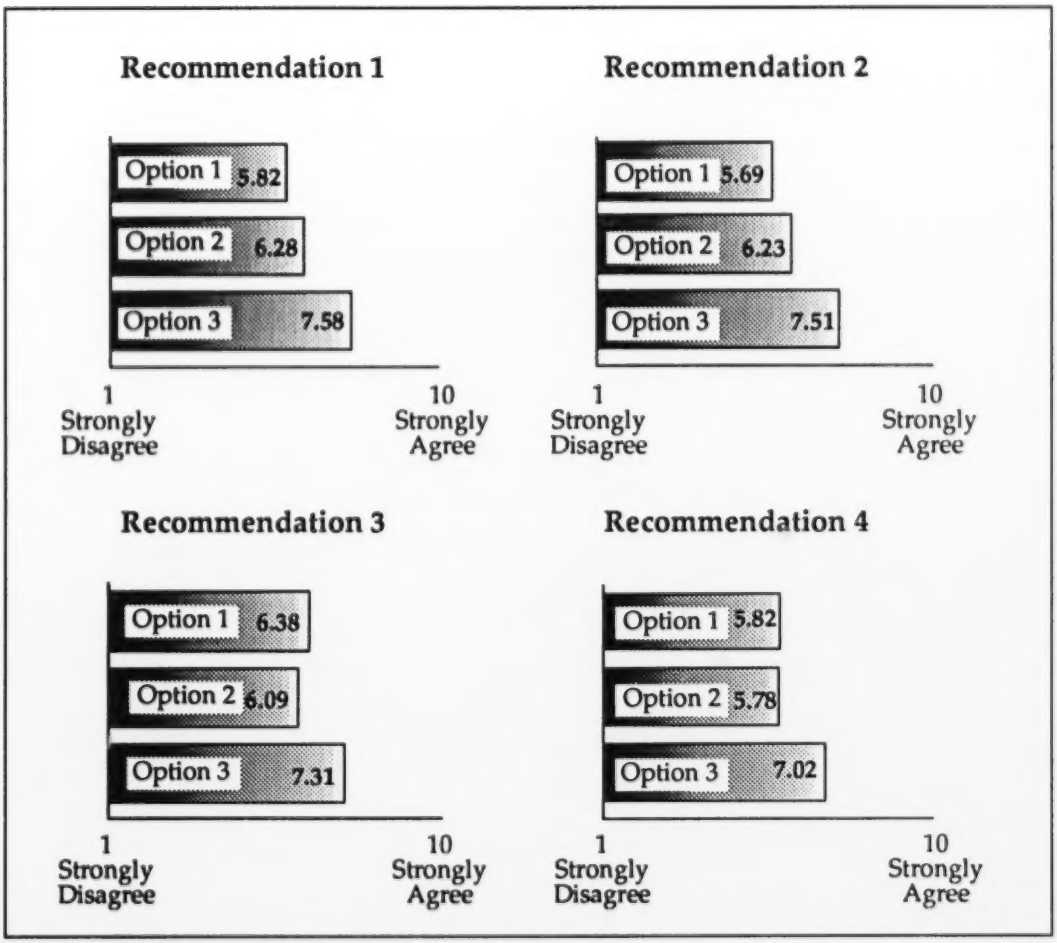

Figure 8. Average ratings of options presented in the *Long-Range Plan*. (Total respondents=745)

As noted in Chapter I, field respondents were asked to evaluate each of the three options that were presented for each of the four recommendations on a scale of 1 (strongly disagree) to 10 (strongly agree). For each recommendation, option 3 received the highest ratings. (See Figure 8.) The specific activities and implementation strategies for undertaking the third option for each recommendation are presented in this chapter. It should be noted that any planning budget for implementation of the *Plan* will have to take account of existing funding programs, local funding support, and existing capacities and resources across the State.

Recommendation 1:

The Regents support the complete integration of technology into the teaching/learning environment of schools and the establishment of teacher and student access to the telecommunications capabilities of the Statewide TNT network and other network services.

The activities for implementing Recommendation 1 include:

- Prepare legislative proposals for funding and changes in laws/regulations to implement the recommendation.

- At the State level, provide fiscal support for expanding the use of technology-related programs, such as CIMS, Model Schools, the Youth-at-Risk project, computer conferencing activities, library projects, and the distance learning grant program.

- At the State level, undertake a wide variety of policy initiatives to clearly focus resources and provide comprehensive support to enable schools to integrate technology within the teaching/learning environment.

- Acquire/install all recommended technical capabilities, including:

  - installing an instructional local area network in each school building

  - providing an advanced teacher/presentation workstation in each classroom of the State

  - providing student workstations in each classroom and making portable student workstations available in each classroom

  - providing a portable workstation for each teacher

  - providing CD-ROM/videodisc resources at the building level, video resources at the classroom level, and distance learning (satellite) capacity at the district level.

    This recommended configuration may vary based on school district needs and technical capacities.

- Provide comprehensive staff development opportunities for every teacher in the State.

- Establish partnerships with technology industries.

Implementation Strategy for Option 3

Field constituencies who evaluated the draft *Plan* indicated a strong agreement with this option (mean = 7.58): Implement those activities of Recommendation 1 that reflect Regents/ Department priorities by 1995.

The recommended activities for this option are:

- Prepare legislation for funding and changes in laws/ regulations to implement the recommendation.

- Provide support for expanding use of Model Schools, CIMS, the Youth-at-Risk Clearinghouse, computer conferencing, distance learning and library projects.

- Encourage and provide an advanced portable computer workstation for every teacher in New York State.

- Acquire/install one advanced teacher presentation system per school building by 1995. This would install an advanced teacher presentation workstation at each of the 3,942 school buildings in the State. Since this presentation workstation would not be installed in each classroom, the projected budget would be reduced significantly. However, this strategy would equip every building in the State with this capability.

- Equip one classroom in each of the 3,942 buildings in the State with a full complement of the instructional technology by 1995. This does not include equipping every classroom with technology capability due to high costs. However, it would ensure that at least one classroom in each school building was equipped with the full range of hardware and software/courseware needed for integrating technology in the teaching/learning environment.

- Encourage district-level coordination of technology planning and use through the role of a district technology coordinator.

- Establish a regional training capacity for teacher/student support of the building technology classroom option by 1995. This strategy would establish a regional staff development capacity for training teachers and students. At a minimum, training would include keyboarding (touch typing), word processing, database, graphing and reporting. It would use existing aid mechanisms/structures, like BOCES, "Big Cities," and Teacher Centers, to support the planning process.

- Establish collaborative partnerships with industry designed to test innovative technology applications within the teaching/learning environment.

Recommendation 2

The Regents support the development of technology systems, including the completion of the development of the Statewide TNT System, the Student and Financial database management applications and connection of all school buildings throughout the State for communications, sharing and reporting purposes.

To summarize, the activities that were presented in the preceding chapter to implement Recommendation 2 are:

- Prepare legislative proposals for funding and changes in laws/regulations to implement the recommendation.
- Complete development of all TNT projects.
- Acquire/install all recommended technical capabilities, including:
  - ✣ connecting all school buildings to TNT
  - ✣ installing a local area network in each school building
  - ✣ providing workstations to all school administrators

  This recommended configuration may vary based on school district needs and technical capacities.
- Provide staff development opportunities to all school administrators.
- Provide a technician for each school district.
- Develop training materials.
- Forge technology partnerships.

Implementation Strategy for Option 3

Field constituencies who evaluated the draft *Plan* indicated a strong agreement with this option (mean = 7.51): Implement those activities of Recommendation 2 that reflect Regents/ Department priorities by 1995.

The recommended activities for this option include:

- Prepare legislation for funding and changes in laws/ regulations to implement the recommendation.

- Complete TNT and SIS by 1993.

- Connect all school buildings for administrator, teacher and student access to TNT by 1995. This would only provide communications capability and one administrative workstation for each school building. While administrative staff in a building would share the workstation, this strategy would provide access to the system for all buildings throughout the State. This option would not provide a workstation to every school administrator. Also, the option would not include the installation of networking capability within each school building. Consequently, projected costs would decline significantly.

- Within each building, acquire/install one workstation for **shared** teacher access and one workstation for **shared** student access to TNT by 1995. The shared teacher workstation would also be accessible to other educational personnel, such as vocational rehabilitation counselors and special educators. The shared student workstation would be configured so that it is accessible by all students, including those with handicaps or disabilities. This option would provide access for teachers and students to TNT, although it would not provide a workstation for each teacher nor provide several student workstations for individual classroom use. Again, projected costs would decline significantly although this strategy would ensure "basic" equity of access to TNT for students, teachers and administrators throughout the State by 1995.

- Establish connectivity standards for a range of hardware at the regional level.

- Train one administrator and one teacher in each building of the State to access TNT/SIS and networked resources by 1995. Projected costs would decline since, initially, training would not be provided to all school administrators and all teachers.

- Forge partnerships with technology industries that establish exemplary demonstrations of the "Vision of the Future."

Note that this option does not include funding for the provision of a technician at each district and the development of training materials.

This option would implement the most critical activities of Recommendation 2, although on a more limited scale and at lower projected costs.

Recommendation 3:

The Regents approve the development and implementation of planning procedures and support activities for complete technology integration at the local, regional and State educational levels.

The major activities required to implement Recommendation 3 are:

- Prepare legislative proposals for funding and changes in laws/regulations to implement the recommendation.
- At the State level, continue development and expansion of the School District Information Study planning model and the Technology Planning for Improving Schools planning model.
- Review technology planning procedures at the regional level with BOCES and "Big Five" Cities to incorporate new procedures and the above models to support *Plan* recommendations.
- Encourage local school districts to develop comprehensive technology plans.
- Encourage district-level coordination of technology planning through the role of a district technology coordinator.

Implementation Strategy for Option 3

Field constituencies who evaluated the draft *Plan* indicated a strong agreement with this option (mean = 7.31): Implement those activities of Recommendation 3 that reflect Regents/ Department priorities by 1995.

These activities include:

- Prepare legislation for funding and changes in laws/ regulations to implement the recommendation.
- Continue development at the State level of the School District Information Study and Technology Planning for Improving Schools planning models.
- Encourage appropriate planning procedures and the

adoption of the above models at the regional level to establish a solid foundation of planning support for local school districts and for integrating services with other programs serving students (such as those serving the handicapped and disabled).

- Initially, work only with school districts that are prepared to develop comprehensive technology plans.

- Encourage district-level coordination of technology planning through the role of a district technology coordinator.

- Encourage school districts to form planning committees, composed of representatives throughout the education community, to plan and implement technology programs.

- Establish procedures and guidelines for all technology programs available to school districts that require planning and that ensure that teacher representatives are designated by their collective bargaining agent.

- Use existing aid mechanisms/structures, like BOCES, "Big Cities," and Teacher Centers, to support the planning process.

- Establish formal working relationships with statewide library development personnel to explore complementary goals, objectives and action recommendations between this *Long-Range Plan* and library technology plans.

- Re-establish the Department's Elementary and Secondary Technology Steering Committee to encourage coordination of technology initiatives with initiatives of the Department's testing, curriculum development and content bureaus and offices.

- Work with appropriate Department Offices to explore the enhancement of the provision of preservice and inservice training and staff development focused on integrating technology in the classroom.

This option includes all of the critical activities of Recommendation 3. However, it focuses the planning process initially on school districts that are ready to begin planning rather than on all school districts in the State. It uses existing regional aid and collaborative strategies as a basis for supporting the implementation of Recommendation 3.

Recommendation 4:

The Regents direct the State Education Department to develop policies and procedures for statewide monitoring and evaluation of the implementation of the *Long-Range Plan* and the tracking of technology-based efforts and expenditures in order to document their effectiveness.

A review of the major critical activities to implement Recommendation 4 include:

- Prepare legislative proposals for funding and changes in laws/regulations to implement the recommendation.
- Establish a steering committee of Department staff, BOCES staff, Teacher Resource and Computer Training Center representatives, teacher union representatives and district computer coordinators to monitor implementation of the *Plan*.
- Evaluate 793 Plans, COSERs, technology special legislative grants for consistency with *Plan* objectives.
- Implement procedures for BOCES review of local district technology plans for consistency with the *Long-Range Plan*.
- Conduct surveys to assess *Plan* impact.

Implementation Strategy for Option 3

Field constituences who evaluated the draft *Plan* indicated a strong agreement with this option (mean = 7.02): Implement those activities of Recommendation 4 that reflect Regents/ Department priorities by 1995.

The following would enable the State to monitor the *Plan* within a reasonable level of funding:

- Prepare legislation for funding and changes in laws/ regulations to implement the recommendation.
- Assign some current staff of the Bureau of Technology Applications the responsibility for management and assessment of the *Long-Range Plan* implementation process.

- Provide additional evaluation and monitoring support through additional staff and contractual arrangements with outside consultants.

- Assess the impact of the *Plan* on teachers and students.

This option would include all of the activities specified for Recommendation 4, but would assign current staff responsibility for monitoring the *Long-Range Plan*.

Appendix A. Technology Network Ties Policies for Statewide Information Systems

Adopted by the Board of Regents
January 1989

1. The Regents recognize the critical need for planning in the uses of technology for management of school programs and the delivery of instruction. Therefore, the Regents adopt the following policy:

> The Regents support the position that planning for the use of technology is critical to facilitate the management of school districts and to utilize the computer in the support of instruction. (Instructional support involves the use of information technology for making decisions about students, but not the use of technology for the direct instruction of students.) School districts must initiate and sustain a coordinated planning effort in order to effectively use technology. This planning must examine all existing hardware and software, existing sources of funding, and the relationship of these with the curriculum objectives of the district. Planning must focus on instructional support, including using student information to examine the objectives of the district and examine the cost-effective application of technology to curriculum support. The focus must not be on the technology itself.

Rationale for this Policy: Planning is the process of defining desirable future situations and then identifying effective methods and approaches for bringing that future into being. The planning process includes: clarity of mission and goals; information about the past and present situation, including representative descriptions of strengths and weaknesses (needs); good forecasts of future trends and the anticipated organizational and external environment; and assessment of

available resources and commitments. Because of the strategic importance of information, the rapidly changing technological environment, the substantial cost for implementing technology systems, and the tremendous negative impact that the lack of planning will produce, the Regents and the Department need to establish the clear need for technology planning. School district planning must address the use of technology.

2. The Regents recognize the crucial importance of a common, integrated database of student and school building information; and a statewide network with standards for allowing access and sharing of information. Therefore, the Regents adopt the following policy:

> The Regents support the database and network standards established within Technology Network Ties and the Student Information System component as the foundation upon which the educational decision making system is to be built. The establishment of these standards is a critical State role and reflects the need of the State to insure that consistent information is available in the most cost- effective manner possible.

Rationale for this Policy: Two prerequisites for making decisions are: (1) a common, integrated database of student and school building information, along with a telecommunication network with appropriate standards for providing flexible access and (2) a sharing of information statewide. Through the work of Technology Network Ties and the Student Information System, which is being conducted in the BOCES Regional Information Centers and the "Big Five" Cities, the establishment of this database and network are under way. It makes good economic and strategic sense to build on the infrastructure already in place to establish a common, statewide database and network and to support decision making at all levels.

3. The Regents recognize the critical importance of information for decision making. Therefore, the Regents adopt the following policy:

> The Regents support the position that the appropriate use of technology can substantially enhance schools' ability to support management and instructional decision making. Teachers and administrators must have reliable, accurate and timely information about all their students. This information must be available to those authorized to use the information in ways that make it

easy to analyze both individual student progress through the curriculum, as well as the success of various groups of students whose progress is aggregated by either student or program characteristics. The Regents endorse the Technology Network Ties/Student Information System as the method to provide more information to teachers and administrators, via technology tools that support decision making.

Rationale for this Policy: Reliable, accurate and timely information is important for appropriate instructional placement of students, delivery of instruction, determination of program success, and the formulation of policy. Information system development and implementation must be focused on the critical need for decision making because they address instructional delivery, program accountability, and empowerment of administrators and teachers with the information necessary for program decision making. State-level information for policy development is expected to be a by-product of good local information systems.

4. The Regents recognize the need for individual student data for state policy making, as well as the importance of security and confidentiality of such information. Therefore, the Regents adopt the following policy:

The Regents have a responsibility to insure that all students in New York State are being equitably educated in a manner that guarantees that minimum standards are met. In order to have a means to support the Regents' and Department's accountability for the equitable treatment of students across the State, a wide variety of individual student demographic and performance data needs to be monitored on a regular basis. The Regents direct that the Department move to collect this information electronically through Technology Network Ties and to make it accessible to the Department through the TNT network.

The Regents are aware of the need to balance the rights of individual students to privacy and the confidentiality of information about students with the Regents' responsibilities to insure equity. The State Legislature continues to require the Department to collect additional student achievement and performance data in order to provide a basis for determining whether all students in the State receive an equitable distribution of educational

program resources. These requirements, along with the Regents' existing responsibility for program accountability, necessitate that a statewide student database, with the individual student as the unit of analysis, must be available to the Department. The Regents, therefore, endorse the collection of individual pupil information via the Technology Network Ties/Student Information System.

The Regents reaffirm the importance of information system security to restrict access to individual pupil information solely to those authorized for such information. Furthermore, the Regents maintain the need to preserve the confidentiality of all students. In order to establish and maintain security and confidentiality, the Regents direct the Department to establish and promulgate guidelines and procedures related to the use of existing and future information systems. Furthermore, the Regents support the prosecution, to the full extent of the law, of any individual or group that accesses or uses information in an unauthorized manner, or any individual or group that uses information systems (or the information they contain) for either personal gain or in a malicious or destructive way.

Rationale for this Policy: In order to insure that all levels of the State system have the information necessary for program decision making, it is critical that detailed data about individual students be available for analysis and reporting through Technology Network Ties and the Student Information System. In order to insure that the goals of both equity and excellence are met, this data must include gender and ethnic information, in addition to other student demographic and achievement data. The key to this information must be each student's unique identification number. In most cases, it is neither necessary nor allowable for the Department to actually examine individual student records without obtaining the requisite parental authorization. What is necessary is the Department's ability to analyze a wide variety of groupings of student data, some of which cannot be easily defined prior to the analysis. Fortunately, the technology established in Technology Network Ties provides a means for individual student data to be included in the TNT database in a way that establishes a level of security that restricts the Department to using applications that generate aggregate information based on individual student data. Furthermore, the State TNT database will never include

individual student names, but rather only student identification numbers. To preserve confidentiality and insure security, the Department will only be able, where allowable, to examine individual student information using the student ID number, not names.